

$N(2060) 5/2^-$

$$I(J^P) = \frac{1}{2}(\frac{5}{2}^-) \text{ Status: } **$$

NODE=B005

## OMITTED FROM SUMMARY TABLE

Before our 2012 *Review*, this state appeared in our Listings as the  $N(2200)$ .

NODE=B005

The latest GWU analysis (ARNDT 06) finds no evidence for this resonance.

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 **$N(2060)$  BREIT-WIGNER MASS**

NODE=B005M

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
<b>≈ 2060 OUR ESTIMATE</b>			
2060 ± 15	ANISOVICH	12A	DPWA Multichannel
1900	BELL	83	DPWA $\pi^- p \rightarrow \Lambda K^0$
2180 ± 80	CUTKOSKY	80	IPWA $\pi N \rightarrow \pi N$
1920	SAXON	80	DPWA $\pi^- p \rightarrow \Lambda K^0$
2228 ± 30	HOEHLER	79	IPWA $\pi N \rightarrow \pi N$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
2116 ± 21	SHRESTHA	12A	DPWA Multichannel
2217 ± 27	BATINIC	10	DPWA $\pi N \rightarrow N\pi, N\eta$

NODE=B005M

→ UNCHECKED ←

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 **$N(2060)$  BREIT-WIGNER WIDTH**

NODE=B005W

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
375 ± 25	ANISOVICH	12A	DPWA Multichannel
130	BELL	83	DPWA $\pi^- p \rightarrow \Lambda K^0$
400 ± 100	CUTKOSKY	80	IPWA $\pi N \rightarrow \pi N$
220	SAXON	80	DPWA $\pi^- p \rightarrow \Lambda K^0$
310 ± 50	HOEHLER	79	IPWA $\pi N \rightarrow \pi N$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
307 ± 112	SHRESTHA	12A	DPWA Multichannel
481 ± 17	BATINIC	10	DPWA $\pi N \rightarrow N\pi, N\eta$

NODE=B005W

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 **$N(2060)$  POLE POSITION**

NODE=B005215

**REAL PART**

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
2040 ± 15	ANISOVICH	12A	DPWA Multichannel
2100 ± 60	CUTKOSKY	80	IPWA $\pi N \rightarrow \pi N$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
2064	SHRESTHA	12A	DPWA Multichannel
2144 ± 31	BATINIC	10	DPWA $\pi N \rightarrow N\pi, N\eta$

NODE=B005RE  
NODE=B005RE**−2×IMAGINARY PART**

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
390 ± 25	ANISOVICH	12A	DPWA Multichannel
360 ± 80	CUTKOSKY	80	IPWA $\pi N \rightarrow \pi N$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
267	SHRESTHA	12A	DPWA Multichannel
438 ± 13	BATINIC	10	DPWA $\pi N \rightarrow N\pi, N\eta$

NODE=B005IM  
NODE=B005IM

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 **$N(2060)$  ELASTIC POLE RESIDUE**

NODE=B005220

**MODULUS  $|r|$** 

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
19 ± 5	ANISOVICH	12A	DPWA Multichannel
20 ± 10	CUTKOSKY	80	IPWA $\pi N \rightarrow \pi N$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
26	BATINIC	10	DPWA $\pi N \rightarrow N\pi, N\eta$

NODE=B005RER  
NODE=B005RER

**PHASE  $\theta$** 

VALUE ( $^{\circ}$ )	DOCUMENT ID	TECN	COMMENT
$-125 \pm 20$	ANISOVICH	12A	DPWA Multichannel
$-90 \pm 50$	CUTKOSKY	80	IPWA $\pi N \rightarrow \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
$-71$	BATINIC	10	DPWA $\pi N \rightarrow N\pi, N\eta$

NODE=B005IMR  
 NODE=B005IMR

 **$N(2060)$  INELASTIC POLE RESIDUE**

The "normalized residue" is the residue divided by  $\Gamma_{pole}/2$ .

**Normalized residue in  $N\pi \rightarrow N(2060) \rightarrow N\eta$** 

MODULUS (%)	PHASE ( $^{\circ}$ )	DOCUMENT ID	TECN	COMMENT
$5 \pm 3$	$40 \pm 25$	ANISOVICH	12A	DPWA Multichannel

NODE=B005240

NODE=B005240

NODE=B005RS1  
 NODE=B005RS1

**Normalized residue in  $N\pi \rightarrow N(2060) \rightarrow \Lambda K$** 

MODULUS (%)	DOCUMENT ID	TECN	COMMENT
$1 \pm 0.5$	ANISOVICH	12A	DPWA Multichannel

NODE=B005RS2  
 NODE=B005RS2

**Normalized residue in  $N\pi \rightarrow N(2060) \rightarrow \Sigma K$** 

MODULUS (%)	PHASE ( $^{\circ}$ )	DOCUMENT ID	TECN	COMMENT
$4 \pm 2$	$-70 \pm 30$	ANISOVICH	12A	DPWA Multichannel

NODE=B005RS3  
 NODE=B005RS3

 **$N(2060)$  DECAY MODES**

NODE=B005225;NODE=B005

Mode	DESIG
$\Gamma_1$ $N\pi$	DESIG=1
$\Gamma_2$ $N\eta$	DESIG=2
$\Gamma_3$ $\Lambda K$	DESIG=3
$\Gamma_4$ $\Sigma K$	DESIG=4
$\Gamma_5$ $N\pi\pi$	DESIG=5
$\Gamma_6$ $\Delta\pi$	DESIG=6
$\Gamma_7$ $\Delta(1232)\pi, D\text{-wave}$	DESIG=7
$\Gamma_8$ $N\rho$	DESIG=8
$\Gamma_9$ $N\rho, S=1/2$	DESIG=9
$\Gamma_{10}$ $N\rho, S=3/2, D\text{-wave}$	DESIG=10
$\Gamma_{11}$ $p\gamma$	DESIG=11
$\Gamma_{12}$ $p\gamma, \text{helicity}=1/2$	DESIG=12
$\Gamma_{13}$ $p\gamma, \text{helicity}=3/2$	DESIG=13
$\Gamma_{14}$ $n\gamma$	DESIG=14
$\Gamma_{15}$ $n\gamma, \text{helicity}=1/2$	DESIG=15
$\Gamma_{16}$ $n\gamma, \text{helicity}=3/2$	DESIG=16

 **$N(2060)$  BRANCHING RATIOS**

NODE=B005230

 **$\Gamma(N\pi)/\Gamma_{total}$   $\Gamma_1/\Gamma$** 

VALUE (%)	DOCUMENT ID	TECN	COMMENT
$8 \pm 2$	ANISOVICH	12A	DPWA Multichannel
$10 \pm 3$	CUTKOSKY	80	IPWA $\pi N \rightarrow \pi N$
$7 \pm 2$	HOEHLER	79	IPWA $\pi N \rightarrow \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
$9 \pm 2$	SHRESTHA	12A	DPWA Multichannel
$13 \pm 4$	BATINIC	10	DPWA $\pi N \rightarrow N\pi, N\eta$

NODE=B005R1  
 NODE=B005R1

 **$\Gamma(N\eta)/\Gamma_{total}$   $\Gamma_2/\Gamma$** 

VALUE (%)	DOCUMENT ID	TECN	COMMENT
$4 \pm 2$	ANISOVICH	12A	DPWA Multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •			
$<1$	SHRESTHA	12A	DPWA Multichannel
$0.2 \pm 1.0$	BATINIC	10	DPWA $\pi N \rightarrow N\pi, N\eta$

NODE=B005R4  
 NODE=B005R4

 **$(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{total}$  in  $N\pi \rightarrow N(2060) \rightarrow N\eta$   $(\Gamma_1\Gamma_2)^{1/2}/\Gamma$** 

VALUE	DOCUMENT ID	TECN	COMMENT
0.066	BAKER	79	DPWA $\pi^- p \rightarrow n\eta$

NODE=B005R2  
 NODE=B005R2

$(\Gamma_i \Gamma_f)^{1/2} / \Gamma_{\text{total}}$ in $N\pi \rightarrow N(2060) \rightarrow \Lambda K$	$(\Gamma_1 \Gamma_3)^{1/2} / \Gamma$	
VALUE	DOCUMENT ID	TECN COMMENT
-0.03	BELL	83 DPWA $\pi^- p \rightarrow \Lambda K^0$
-0.05	SAXON	80 DPWA $\pi^- p \rightarrow \Lambda K^0$
••• We do not use the following data for averages, fits, limits, etc. •••		
0.00±0.03	SHRESTHA	12A DPWA Multichannel
<b><math>\Gamma(\Sigma K) / \Gamma_{\text{total}}</math></b>		
VALUE (%)	DOCUMENT ID	TECN COMMENT
3±2	ANISOVICH	12A DPWA Multichannel
<b><math>\Gamma(\Delta(1232)\pi, D\text{-wave}) / \Gamma_{\text{total}}</math></b>		
VALUE (%)	DOCUMENT ID	TECN COMMENT
••• We do not use the following data for averages, fits, limits, etc. •••		
40±13	SHRESTHA	12A DPWA Multichannel
<b><math>\Gamma(N\rho, S=1/2) / \Gamma_{\text{total}}</math></b>		
VALUE (%)	DOCUMENT ID	TECN COMMENT
••• We do not use the following data for averages, fits, limits, etc. •••		
21±15	SHRESTHA	12A DPWA Multichannel
<b><math>\Gamma(N\rho, S=3/2, D\text{-wave}) / \Gamma_{\text{total}}</math></b>		
VALUE (%)	DOCUMENT ID	TECN COMMENT
••• We do not use the following data for averages, fits, limits, etc. •••		
<9	SHRESTHA	12A DPWA Multichannel

### N(2060) PHOTON DECAY AMPLITUDES

Papers on  $\gamma N$  amplitudes predating 1981 may be found in our 2006 edition, Journal of Physics, G **33** 1 (2006).

<b><math>N(2060) \rightarrow p\gamma</math>, helicity-1/2 amplitude <math>A_{1/2}</math></b>			NODE=B005235
VALUE ( $\text{GeV}^{-1/2}$ )	DOCUMENT ID	TECN COMMENT	NODE=B005235
0.065±0.012	<sup>1</sup> ANISOVICH	12A DPWA Phase = $(15 \pm 8)^\circ$	
••• We do not use the following data for averages, fits, limits, etc. •••			
0.018±0.004	SHRESTHA	12A DPWA Multichannel	
<b><math>N(2060) \rightarrow p\gamma</math>, helicity-3/2 amplitude <math>A_{3/2}</math></b>			NODE=B005A2
VALUE ( $\text{GeV}^{-1/2}$ )	DOCUMENT ID	TECN COMMENT	NODE=B005A2
0.055 <sup>+15</sup> <sub>-35</sub>	<sup>1</sup> ANISOVICH	12A DPWA Phase = $(15 \pm 10)^\circ$	
••• We do not use the following data for averages, fits, limits, etc. •••			
0.010±0.004	SHRESTHA	12A DPWA Multichannel	
<b><math>N(2060) \rightarrow n\gamma</math>, helicity-1/2 amplitude <math>A_{1/2}</math></b>			NODE=B005A3
VALUE ( $\text{GeV}^{-1/2}$ )	DOCUMENT ID	TECN COMMENT	NODE=B005A3
••• We do not use the following data for averages, fits, limits, etc. •••			
-0.012±0.017	SHRESTHA	12A DPWA Multichannel	
<b><math>N(2060) \rightarrow n\gamma</math>, helicity-3/2 amplitude <math>A_{3/2}</math></b>			NODE=B005A4
VALUE ( $\text{GeV}^{-1/2}$ )	DOCUMENT ID	TECN COMMENT	NODE=B005A4
••• We do not use the following data for averages, fits, limits, etc. •••			
-0.023±0.023	SHRESTHA	12A DPWA Multichannel	

### N(2060) FOOTNOTES

<sup>1</sup> This ANISOVICH 12A value is the complex helicity amplitude at the pole position.

### N(2060) REFERENCES

ANISOVICH	12A	EPJ A48 15	A.V. Anisovich <i>et al.</i>	(BONN, PNPI)	REFID=54041
SHRESTHA	12A	PR C86 055203	M. Shrestha, D.M. Manley	(KSU)	REFID=54862
BATINIC	10	PR C82 038203	M. Batinic <i>et al.</i>	(ZAGR)	REFID=53552
ARNDT	06	PR C74 045205	R.A. Arndt <i>et al.</i>	(GWU)	REFID=51535
PDG	06	JPG 33 1	W.-M. Yao <i>et al.</i>	(PDG Collab.)	REFID=51004
BELL	83	NP B222 389	K.W. Bell <i>et al.</i>	(RL) IJP	REFID=30409
CUTKOSKY	80	Toronto Conf. 19	R.E. Cutkosky <i>et al.</i>	(CMU, LBL) IJP	REFID=30064
Also		PR D20 2839	R.E. Cutkosky <i>et al.</i>	(CMU, LBL)	REFID=40096
SAXON	80	NP B162 522	D.H. Saxon <i>et al.</i>	(RHEL, BRIS) IJP	REFID=30404
BAKER	79	NP B156 93	R.D. Baker <i>et al.</i>	(RHEL) IJP	REFID=30056
HOEHLER	79	PDAT 12-1	G. Hohler <i>et al.</i>	(KARLT) IJP	REFID=30058
Also		Toronto Conf. 3	R. Koch	(KARLT) IJP	REFID=30859